Alg. 2 Warm Up # 4-3

Go down and exchange your book for volume two!

1. Find the slope of the line through the points: (-2, 0) and (0, 1).

$x_1, y_1 \quad x_2\, y_2 \quad m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-0}{0+2} = \frac{1}{2}$

2. Find the slope of the line perpendicular to the line above. -2

3. What is the relationship between slopes of perpendicular lines? Opposite signs and reciprocals

4. Find an equation of the line perpendicular to y = 3x + 4, that passes through the points: $m_\perp = -\frac{1}{3}$

a) (0, 6) b) (-7, 13) c) (0.4, -1.2) d) (8, 1)

$y = -\frac{1}{3}x + 6$

$-1/3x$

$y - y_1 = m(x - x_1)$

b) $y - 13 = -\frac{1}{3}(x+7)$

c) $y + 1.2 = -\frac{1}{3}(x - 0.4)$

d) $y - 1 = -\frac{1}{3}(x - 8)$

Homework Questions: White worksheet

3) $6x^2y^4 \cdot 4x^{-6}y$

$6 \cdot 4 \cdot x^2 \cdot x^{-6} \cdot y^4 \cdot y^1$

$24 \cdot x^{-4}\, y^5$

$\frac{24y^5}{x^4}$

6) $g(f(10))$

$g\left(\frac{6}{10-2}\right)$

$g\left(\frac{3}{4}\right)$

$\sqrt{\frac{3}{1}\cdot\frac{4}{4} - \frac{3}{4}}$

$\sqrt{\frac{12}{4} - \frac{3}{4}}$

$\sqrt{\frac{9}{4}}$

$\boxed{\frac{3}{2}}$

1) $(5x)^2(15x^5)^{-1}$

$\frac{25x^2}{1} \cdot \frac{1}{15x^5}$

$\frac{\cancel{25}^{5}x^2}{\cancel{15}_{3}x^5}$

$\frac{5}{3x^3}$

$x^{2-5} = x^{-3}$

$\frac{\cancel{x}\cdot\cancel{x}}{\cancel{x}\cdot\cancel{x}\cdot x \cdot x \cdot x}$

7. $y = \log_2 x$

Same as

$2^y = x$

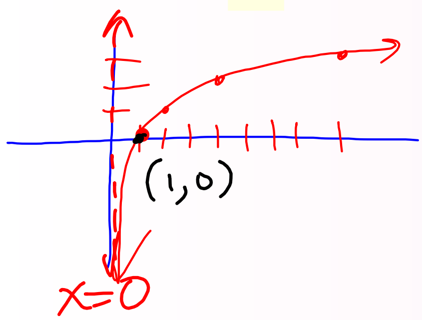
x	y
1	0
2	1
4	2
8	3

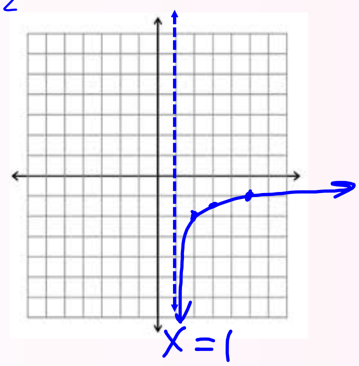
$y = \frac{1}{2}\log_2(x-1) - 2$

Rt 1, vertical compression $\frac{1}{2}$, down 2

Rt 1	$\frac{1}{2}$
2	0
3	$\frac{1}{2}$
5	1
9	$\frac{3}{2}$

	down 2
2	-2
3	$-\frac{3}{2}$
5	-1
9	$-\frac{1}{2}$





8) $\dfrac{3}{(x-4)(x+1)} + \dfrac{6}{(x+1)}\dfrac{(x-4)}{(x-4)}$

$\dfrac{3+6x-24}{(x-4)(x+1)}$

$\dfrac{6x-21}{(x-4)(x+1)}$

$\dfrac{3(2x-7)}{(x-4)(x+1)}$

11) $\dfrac{x+2}{x^2-9} - \dfrac{1}{x+3}$

$\dfrac{x+2}{(x+3)(x-3)} - \dfrac{1}{(x+3)}\dfrac{(x-3)}{(x-3)}$

13) $\dfrac{cd}{1}\left(\dfrac{3}{c} + \dfrac{2c}{d}\right)$

12) $\dfrac{ab}{1}\left(\dfrac{1}{a} + \dfrac{1}{b}\right)$

$\dfrac{\cancel{a}b}{1} \cdot \dfrac{1}{\cancel{a}} + \dfrac{a\cancel{b}}{1} \cdot \dfrac{1}{\cancel{b}}$

$b + a$

CP's: 6 - #1 ---> 6

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6.1.1 How can I plot points in three dimensions?

Creating a Three-Dimensional Model

In geometry, you worked with objects that existed in different dimensions. You considered lines and line segments, which have only one dimension: length. You also looked at flat shapes like circles, rectangles, and trapezoids that have two dimensions: length and width. Prisms, cones, and most objects that you encounter in the real world have volume, and therefore have three dimensions: length, width and height.

When you worked with graphs in Algebra 1, you represented points, the number line, and curves on a **two-dimensional** (flat) surface called the *xy*-plane. So far, you have only been able to represent relationships with at most two unknowns, usually the variables x and y. However, many problems, like some that you may have done in homework problems in Chapter 6, have more than two unknowns. Today, you and your team will build a model that will help you graph in three dimensions. As you work on this lesson, consider the following questions with your team:

How can we plot a point in three dimensions?

How can we write the coordinates of a point in three dimensions?

How can we show three dimensions on flat paper?

together:

6-1. Consider when it is appropriate to graph a situation in one, two, and/or three dimensions. It may be helpful to think about your experience representing numbers and relationships on a number line or an *xy*-plane, and how you can adapt your knowledge to work in three dimensions. Discuss each question with your team before writing your response.

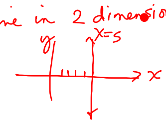
a. How can you represent the solution to $x = 5$ graphically? Can you think of more than one way?

b. How can you represent the solutions to $x + 2y = 5$ graphically?

c. How could you represent the solutions to $x + 2y + z = 5$? What would the solutions look like? Discuss these questions with your team and write down any ideas that you have.

a) $x=5$ is a point on the number line in one dimension:

or it is a vertical line in 2 dimensions, on the xy-plane.



Resource Managers:

Scissors

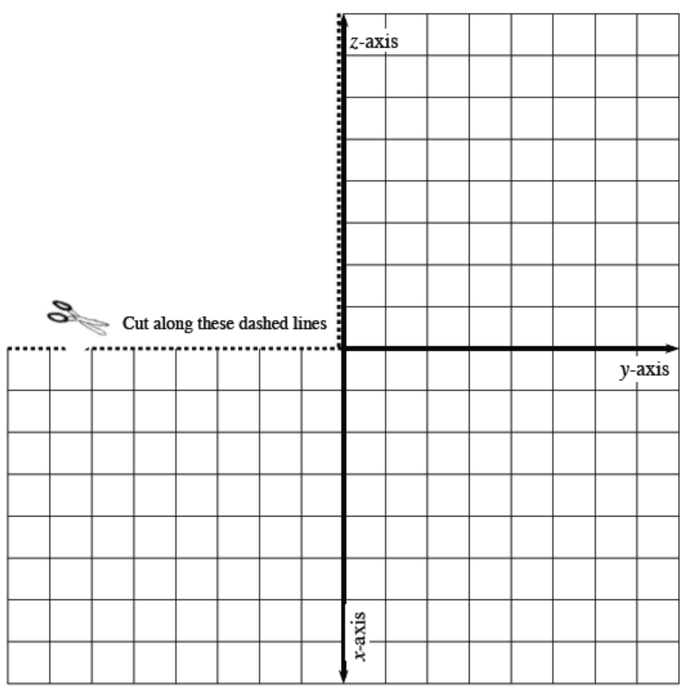
Tape

Cup of cubes

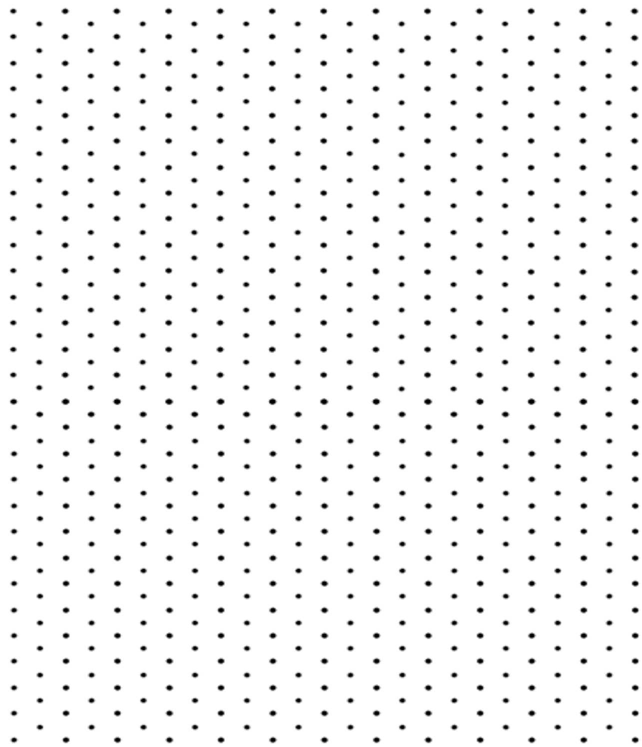
One resource page for each person on your team

If you were absent, print off the next 2 pages.

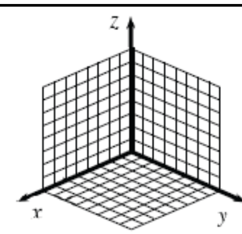
Lesson 6.1.1A Resource Page



Lesson 6.1.1C Resource Page: Isometric Dot Paper



6-2. To graph solutions to equations with three variables, you need to use a three-dimensional coordinate system. Obtain a Lesson 6.1.1A or 6.1.1B Resource Page from your teacher. Use scissors to cut out the region indicated on the page. Then fold along each of the axes and use tape to attach the dashed edge to the z-axis. Be sure that the grid ends up on the *inside* of your model (rather than the outside). The result should look similar to the diagram at right.



6-3. Place a penny (or other marker) on the bottom surface of your model at the point where $x = 4$ and $y = 2$. Now lift your marker straight up so that it you are holding it 3 units above the bottom of the model.

a. With your team, find a way to write the coordinates of this point.

b. In your model, find the point where $x = 3$, $y = 4$, and $z = 2$. Use your team's method to write the coordinates for this point.

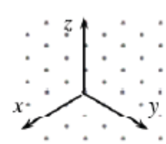
c. The model you have created is only a portion of the entire coordinate system used to represent three dimensions mathematically. How many of these models would you have to put together to create a model that represents the entire three-dimensional coordinate system? Think about the regions you would need to graph points like $(5, -2, -7)$ or $(-1, -2, -4)$.

6-4. Use cubes to build each shape described below inside your three-dimensional model. Make sure that one corner of each shape you build lies at the **origin** (at the point $(0, 0, 0)$).

a. Build a $2 \times 2 \times 2$ cube. Use coordinates to name the vertex that is farthest from the origin.

b. Build a rectangular prism that is 2 units in length along the x-axis, 1 unit in length along the y-axis, and 3 units in length along the z-axis. Use coordinates to name the vertex that is farthest from the origin.

c. Draw and label a three-dimensional coordinate system on isometric dot paper, as shown at right. Now add the prism from part (b) to the drawing. On your dot paper, label the coordinates of *all* of the vertices.



6-5. Build a rectangular prism that will have vertices in your model at $(1, 0, 0)$, $(0, 0, 4)$, and $(0, 3, 0)$.

a. Find the coordinates of the other five vertices.

b. Move the rectangular prism so that three vertices are at $(-1, 0, 0)$, $(0, 0, 4)$, and $(0, 3, 0)$. Now where are the other vertices?

c. Is it possible to build another rectangular prism that has the same coordinates for the vertex farthest from the origin as the prism in part (b)? Be sure to justify your conclusion.

6-6. On isometric dot paper, draw a three-dimensional coordinate system and plot the following points: $(0,1,-1)$, $(1,2,0)$, and $(2,3,1)$.

a. What do you notice about the three points?

b. With your team, find a strategy to make each point clearly different from the others. Be prepared to share your strategy with the class.

c. Identify the coordinates of two points that appear to be the same as $(-2, 0, 0)$.

HW: 6 -

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